



INSTALLATION GUIDE

ECX-200

DVB-C Cable Processor



English

design for TV

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1 Introduction

Thank you for purchasing an A2B Electronics product. The ECX-200 is a revolutionary solution for reception and modification of QAM transmitted TV-content into various transmission formats for cable-TV and SMATV.

The ECX-200 is delivered with hardware and software that supports DVB-C reception, MPEG2/MPEG4 H.264 AVC, ASI output, VSB RF modulation with NICAM or A2 audio, SNMP Interface, IP control and management. All hardware needed for upgrade with software options is available from the start. See section 7 SW Options for more information.

ECX-200 can be upgraded for enhanced functionality and various formats for transmission and processing of digital TV content by upgrade of its firmware. Software options are available from A2B Electronics, please ask us for the specifications and complete price list of all options.

A2B Electronics AB
Phone: +46 (0)141 229115
E-mail: support@a2b.se

Also visit our web site www.a2b.se for further support.



2 Unpacking the unit

Following components are included in the package:

Amount	Description
1	ECX-200 Cable Processor
1	Installation guide
2	Front panel screws

NOTE! There is no SW CD, nor any Control Software CD. The unit is delivered with all necessary SW embedded including web server for control and settings of the unit.

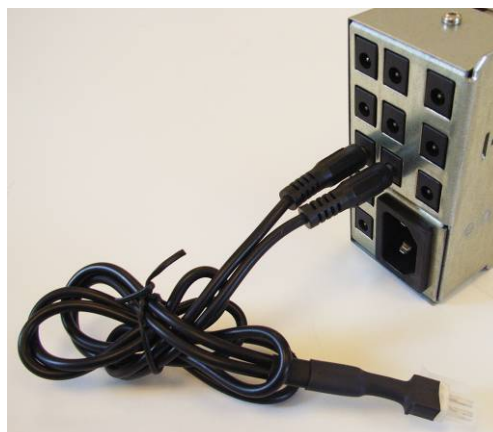
Every unit is quality controlled by us before delivery. Should any items be missing when unpacking, please contact our support service (see page 3 for contact info).



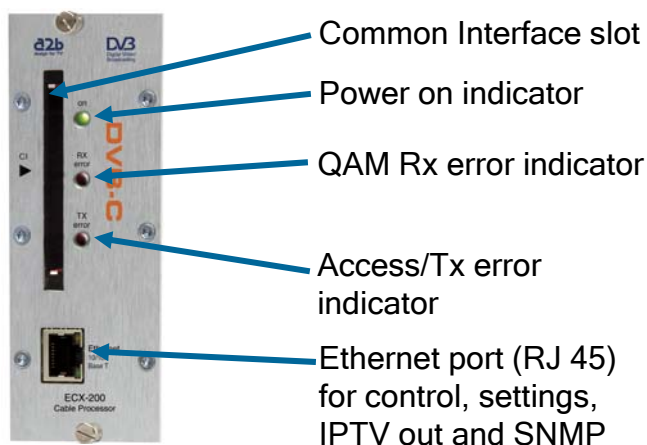
Important information about power supply to ECX-200

To avoid problems with ECX-200 and/or EPP-100 it is very important that both DC plugs on the EXM power cord are inserted into the EPP-100, i.e. each EXM unit needs to be fed from two DC outputs at the rear end of EPP-100. (See picture to the right).

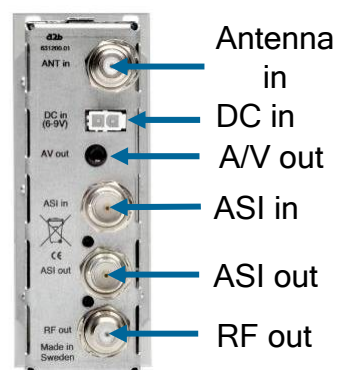
NOTE! Never connect two EPP units to feed one ECX-200



3 Connections and indications



Front panel view of ECX-200



Rear panel view of ECX-200

Common Interface	Insert your Common Interface Conditional Access module into this slot
Power on indicator	Green light indicates that power is on.
Rx error	Red light indicates that the receiver is not locked to the QAM transmission.
Access/Tx error	Red light indicates that the smart card is not authorised or that decryption is not working properly
Ethernet port	Ethernet for connection to a PC or handheld device with web browser
Antenna in	Connect your QAM signal to this input.
RF out	Connection to Cable TV or SMATV network.

(continued)

3 Connections and indications (continued)

AV out *)	Connection for monitoring or to an RF modulator.
ASI in *)	Input for ASI (Asynchronous Serial Interface) for high speed transport stream reception.
ASI out	Output for ASI (Asynchronous Serial Interface) for high speed transport stream transmission.
DC in	Connect a DC voltage to this input (6-10V).

**) Optional function i.e. SW Options is needed*

NOTE! We recommend to use only A2B original power supply for correct functionality and life cycle. Warranty will be void in case of damages caused by power supplies not supplied by A2B.

4 Settings

ECX-200 has an embedded web server allowing standard web browsers

(Internet Explorer 8, Firefox, Opera etc.) to connect to the unit for settings and management.

No controller software is needed.

The ECX-200 has by default a static IP address for connecting your PC to the unit.

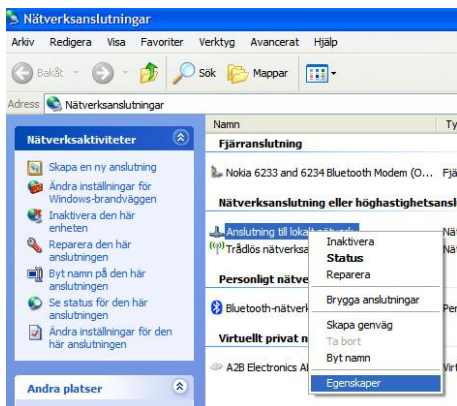
The ECX-200 is delivered with IP address: 192.168.0.20. First time installation requires that you set a static IP address on your computer. For example set your PC to IP address: 192.168.0.19 and Net mask: 255.255.255.0



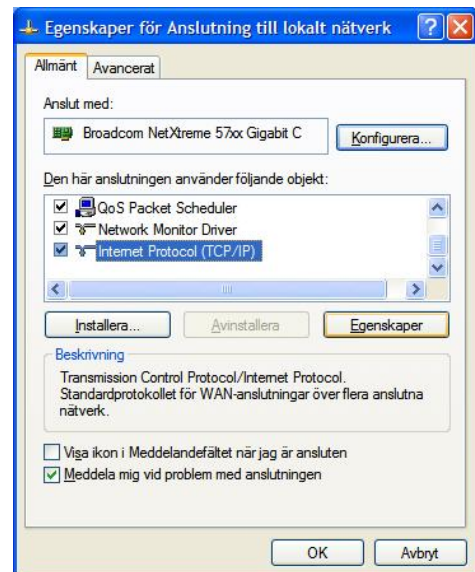
4 Settings (continued)

4.1 TCP/IP settings for Windows XP (setting your PC to 192.168.0.19)

Click "Start", select "Control panel" and select "Network connections" and then select "Network and Internet settings". "Right click" on [Settings for local network] and select [Properties].

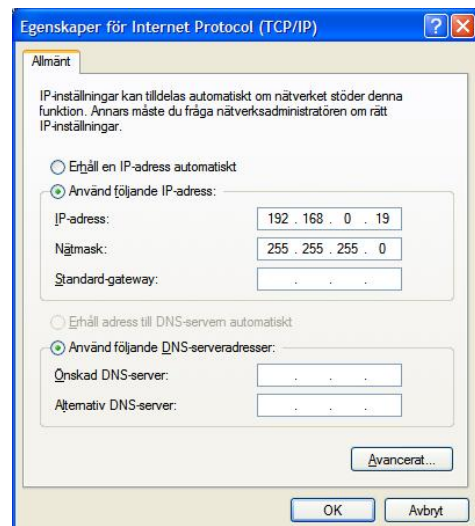


In Properties click [Internet protocol (TCP/IP)] and select [Properties].



Select [Use this IP address] and write: 192.168.0.19 and select [Net mask] 255.255.255.0. Click [OK] and then click [Close].

NOTE! For PC with other Operating Systems (OS) than Windows, please consult the Owners manual for your PC for [IP/Network settings].



4.2 Connecting your PC to ECX-200

Connect the ECX-200 to a DC power supply (EPP-100).
See section 6 for installation.

Next connect your PC to the ECX-200 with a network cable.

Start your web browser (Internet Explorer 8, Firefox, Opera etc.) and write the IP address 192.168.0.20 in the address field in your browser.

4 Settings (continued)

4.3 EXM Web Control Interface

4.3.1 System menu

The following **[System]** menu should appear when you connect to the ECX-200. The **[System]** menu contains basic information about current settings and SW options.

Menu buttons for **[Input]**, **[Output]**, **[IPTV]**, **[Service management]**, **[CI]** and **[Upload]** are available at the top of the menu.

NOTE! [IPTV] needs a SW option to be available

EXM Web Control Interface



System	Input	Output	IPTV	Service management	CI	Upload
--------	-------	--------	------	--------------------	----	--------

Current settings

Tuner: DVB-C
Output: Analogue
IPTV out: Disabled
Tuner locked: Yes
Firmware version: EXX-200 version 1.23
Bootloader version: 1.02
Hardware revision: 1203
Serial number: 0350010022402054

Software options

Basic functionality (EXM-Basic)
Enabled options: EXM-RC, EXM-RT, EXM-RIPout, EXM-AV (EXM-ALL)

System options

IP address:	172	19	99	48
Netmask:	255	255	0	0
Gateway:	172	19	0	1

System diagnostic

[Download diagnostic file](#)

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Current settings

Contains information of current input and output signals, if the tuner is locked to a signal, firmware version, bootloader version, hardware revision and serial number.

Software options

Show what software options that are available in this unit (e.g. output signal format, input signal etc.) See section 7 for more information.

System options

This menu contains current IP settings for the ECX-200.

[Reset unit] gives a possibility to restart the unit at any time.

[System diagnostic]

By a click on the "Download diagnostic file" you can save a file that you can email to support@a2b.se for analysis if there is a problem with a unit.

4.3.2 IP address settings

The ECX-200 is set to an default IP address from factory (192.168.0.20). However, it is possible to change the IP address and/or the Netmask and/or the Gateway. This is an important function when you install two or more EXM units in a Head End and want to connect all units together through a switch or a router.

4 Settings (continued)

IP address settings (continued)

Setting new static IP address in the ECX-200

Connect your PC to each EXM unit after that you have done all other settings in the units and change to a specific IP address for every unit.

A recommendation is to use from 192.168.0.21 and higher.

NOTE! Almost every switch/router use 192.168.0.1 as default IP address so make sure you don't use the same IP address in any ECX-200 unit.

EXM Web Control Interface



System	Input	Output	IPTV	Service management	CI	Upload
--------	-------	--------	------	--------------------	----	--------

Current settings

Tuner: DVB-C
Output: Analogue
IPTV out: Disabled
Tuner locked: Yes
Firmware version: EXX-200 version 1.23
Bootloader version: 1.02
Hardware revision: 1203
Serial number: 0350010022402054

Software options

Basic functionality (EXM-Basic)
Enabled options: EXM-RC, EXM-RT, EXM-RIPout, EXM-AV (EXM-ALL)

System options

IP address:	172	19	99	48
Netmask:	255	255	0	0
Gateway:	172	19	0	1

System diagnostic

[Download diagnostic file](#)

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To continue settings press [Input]

4.3.3 Tuner settings

Select [Modulation], [Symbol rate] and the [Channel name] or enter the [Transponder frequency] (in MHz).

Press [Set] to save settings.

A list of the available services from the multiplex you tuned to, will be shown on the right hand side and also available services via the ASI input.

Below [Tuner settings] information of the received signal is displayed.

Note! We recommend that the input level is better than -45dBm and that the C/N is better than 36 dB (QAM64).

EXM Web Control Interface



System	Input	Output	IPTV	Service management	CryptoLITE	CI	Upload
--------	-------	--------	------	--------------------	------------	----	--------

Tuner settings

Disable tuner ☐
Locked: Yes
Level: -33.9 dBm
C/N: 37.7 dB

Modulation:	64QAM	<input type="button" value="Set"/>
Symbol rate:	6875	<input type="button" value="Set"/>
Channel name:	S23	<input type="button" value="Set"/>
Transponder frequency(MHz):	322	<input type="button" value="Set"/>

Available services

Tuner:
TV3 Stockholm
TV1000
Cartoon/TCN
SVT1 Östnytt
SVT2 Östnytt
SVT24
Barn/Kunskapsk.

ASI:
TV8
CNN
BBC World News

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4 Settings (continued)

We suggest that you consult your service provider for correct parameters for each multiplex you want to receive.

Click [Output] to continue with the output settings.

4.3.4 Output settings

ASI mode

The output selection ASI disables all RF modulation on the outputs and all selected services will be transmitted only through the ASI output connector. ASI is a high speed interface for digital TV transport streams. Use this output mode if you run IPTV out. Under **[ASI options]** you can select the output bitrate which is the same bitrate as for IPTV out.

Analogue mode

The selection **[Analogue]** is set as factory default as RF output .

Country specific settings can be done by selecting **[Country]**. By selecting a specific country, transmission standard and languages are automatically preset. **[Audio language]** gives you the choosen language if there is more than one language in the received signal.

[Audio level] can be adjusted between +3 to -9 dB.

Subtitling type, subtitle priority and subtitle charset can be selected as well as Subtitle conversion and Subtitle WSS.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:

☒ ASI
☐ Analogue
☐ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

ASI options

Bitrate (MBit):

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Output

Output mode:

☐ ASI
☒ Analogue
☐ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

Analogue options

Country:
Audio language:
Audio level (dB):

Video Conversion:
Video WSS:
Bitrate (MBit):

Subtitle: ☒ Inactive
☐ Active

Subtitle priority: ☒ DVB
☐ Teletext

Subtitle type: ☒ Normal
☐ Hearing impaired

Subtitle charset:
Subtitle language:
Subtitle conversion:
Subtitle WSS:

Radio channel OSD: ☒

Bg color (rgb):
Text color (rgb):

Attenuation (dB):

Chanrel name:
Frequency (MHz):

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4 Settings (continued)

4.3.4 Analogue mode (cont)

If you click on the “Advanced settings” text line you can do settings for [Country], [Video system], [Audio system], [Audio dual mono] and adjust [Mono subcarrier level] and/or [Stereo subcarrier level] if necessary.

When [Audio dual mono] is selected you have to set Audio language for the correct priority of sound.

In the scroll list for [Mono subcarrier level] and for [Mono subcarrier level] you can also switch the subcarrier(s) to Off.

Adjustment for [A/V Audio level] is also possible to do if the SW option “EXM-AV” is downloaded in the unit.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:
☐ ASI
☒ Analogue
☐ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

Analogue options

Country: Sweden

[Advanced settings >](#)

Video system: PAL B/G

Audio system: NICAM

Audio dual mono: ☐

Mono subcarrier level: -13 dB

Stereo subcarrier level: -20 dB

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:
☐ ASI
☒ Analogue
☐ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

Analogue options

Country: Sweden

[Advanced settings >](#)

Audio language: Swedish

Audio level (dB): -3

A/V Audio level (dB): 0

Video Conversion: x16:9 (forced)

Video WSS: 4:3

Bitrate (MBit): Set

Subtitle: ve

4 Settings (continued)

4.3.4 Analogue mode (cont)

It is possible to select scaling of the picture format to fit with connected TV sets. This is handled in the **[Video conversion]** drop down list where it's possible to choose between the different types. **[Video WSS]** (Wide Screen Signalling) is available in the video for signalling of the aspect ratio to be displayed by the TV sets.

[Bitrate] can be set and this sets the bitrate at the ASI output.

NOTE! Refer to the table in page 17 about correct values.

[Radio Channel OSD] gives you the possibility to display the name of a radio channel on connected TV sets. You can choose Bg colour (background colour) and Text colour of the Radio channel name.

[Attenuation] can be chosen from 0 to -31 dB

You can select output **[Channel name]** (E2 to E69) or **[Frequency]** within steps of 1 kHz (e.g. 306,167 MHz) in all three output modes (Analogue, COFDM or QAM).

Click **[Set]** to save settings.

QAM mode (SW option)

When selecting **[QAM]** DVB-C output, there are settings for Output channel (E2 to E69) or Frequency, QAM mode (16, 32, 64, 128 or 256QAM), Baud rate (kBaud) and Output signal attenuation (0 to -31dB). Click **[Set]** to save settings.

NOTE! Some of the choices needs optional software to be uploaded before they can be selected.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:
☐ ASI
☒ Analogue
☐ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

Analogue options

Country: Sweden
Audio language: Swedish
Audio level (dB): -3

Video Conversion: Letterbox 16:9
Video WSS: Automatic
Bitrate (MBit): 38 Set

Subtitle: ☒ Inactive
☐ Active
Subtitle priority: ☒ DVB
☐ Teletext
Subtitle type: ☒ Normal
☐ Hearing impaired
Subtitle charset: Latin 0
Subtitle language: Swedish
Subtitle conversion: None
Subtitle WSS: Automatic

Radio channel OSD: ☒
Bg color (rgb): 0 0 0
Text color (rgb): 255 255 255
Attenuation (dB): 30 Set
Channel name: E5
Frequency (MHz): 175.25 Set

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EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:
☐ ASI
☐ Analogue
☒ QAM
☐ COFDM

Note: Switching output modes may take a few seconds.

QAM options

Baudrate (kBaud): 6875 Set
Constellation: 64
Attenuation (dB): 30 Set
Channel name: E21
Frequency (MHz): 474 Set

4 Settings (continued)

COFDM mode (SW option)

For [COFDM] (DVB-T) output you can select Output channel (E2 to E69) or Frequency and Output signal attenuation (0 to -31dB). You can also select bandwidth (6,7 or 8 MHz). For max recommended output bitrate see page 17. Click [Set] to save settings.

COFDM modulation settings are 2k, 64QAM, FEC 7/8, GI 1/32

Click [Service management] to select service(s) and or create new multiplexes.

4.3.5 Service Management

The Service management menu gives an overview of available services from satellite or the ASI input (if enabled). Remultiplexing (remuxing) is possible after downloading an appropriate SW option. To build your own MUX you combine several incoming services. These can be received either from the tuner or from the ASI in. Under the [Digital output] section in this menu you can see the actual (instantaneous) “Outgoing data rate” and the “Configured data rate”. This helps you to avoid overload for the output (see page 17 for information). From FW 1.23 there is also logging of Output bit rate in the SNMP (see page 29)

NOTE! When a service is selected as Analogue output only, a web reset or a power reset is necessary, to start decoding of the selected service.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Output

Output mode:
☐ ASI
☐ Analogue
☐ QAM
☒ COFDM

Note: Switching output modes may take a few seconds.

COFDM options

Bandwidth (MHz): 8

Attenuation (dB): 30 Set

Channel name: E21

Frequency (MHz): 474 Set

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Service management

Available services

Name	Provider	ID	Source	Dig	Ana	CI
Gospel Channel Europe	Telenor	129	Tuner	X		
BBC World News	Telenor	1001	Tuner		X	
BBC Entertainment	Telenor	1103	Tuner			
Star	Telenor	1609	Tuner			
Bloomberg	Telenor	1830	Tuner			
Showtime	Telenor	2111	Tuner			
St-Sh TS	Telenor	2507	Tuner			
History Channel	Telenor	2511	Tuner			
FEM	Telenor	2512	Tuner			
Viasat 4	Telenor	2514	Tuner			
Kjaerulff 1232 Loader	Telenor	2917	Tuner			

Output:
Set digital Set analogue Remove analogue

Decryption:
Enable Disable

Digital output

Outgoing data rate: 6.12 Mbit/s
Configured data rate: 38.02 Mbit/s

Name	Provider	ID	Source	Options
Gospel Channel Europe	Telenor	129	Tuner	+
BBC World News	Telenor	1001	Tuner	+

Remove selected Reset services Network settings

4 Settings (continued)

In the menu section *Available services* all services the unit receives, both from the [Tuner input] and from the [ASI input], are listed. To select the service or services you want as output, mark services under [Available services] by clicking the line where the service is presented and then click the “Set digital” button. A “X” should appear in the “Dig” column. Do the same to choose a service as “Analogue out”. Make your choice of which services you want to select as outputs and you will see the selected service(s) in the [Digital output] list in the menu.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Service management

Available services

Name	Provider	ID	Source	Dig	Ana	CI
Gospel Channel Europe	Telenor	129	Tuner	X		
BBC World News	Telenor	1001	Tuner	X		
BBC Entertainment	Telenor	1103	Tuner			
Star	Telenor	1609	Tuner			
Bloomberg	Telenor	1830	Tuner			
Showtime	Telenor	2111	Tuner			
St-Sh TS	Telenor	2507	Tuner			
History Channel	Telenor	2511	Tuner			
FEM	Telenor	2512	Tuner			
Viasat 4	Telenor	2514	Tuner			
Kjaerulff 1232 Loader	Telenor	2917	Tuner			

Output:

Decryption:

Digital output

Outgoing data rate: 6.11 Mbit/s
Configured data rate: 38.02 Mbit/s

Name	Provider	ID	Source	Options
Gospel Channel Europe	Telenor	129	Tuner	+
BBC World News	Telenor	1001	Tuner	+

Network settings

NetworkProviderName:

Network ID:

Original Network ID:

Transportstream ID:

Logical channel type:

The ASI output automatically contains the services you have selected for [Digital output].

For decryption you mark the service by clicking the service name in the [Available services] list and by clicking on “Enable” under the [Decryption] headline.

NOTE! To decrypt more than one service requires a multidecryption CA module and a smartcard that is activated for more than one service. Some smartcards can handle three or more services at a time. Please refer to your smartcard service provider and or program provider for further information.

Network settings

Click the [Network settings] button to display the Network settings menu. Here you can write [Network Provider Name], [Network ID], [Original Network ID], [TransportStream ID] and select [Logical channel type]. When one or more choices has been made, you have to click on [Save] to store your settings. The DVB standard recommends following Network ID ranges:

DVB-S: 0 to 8191 (0 should be avoided)

DVB-T: 8193 to 13568 (Boxer in Sweden use 8945)

DVB-C: 40961 to 65281 (ComHem in Sweden use 41001 and up)

To make Network search to work on STB:s (Set Top Boxes) that are connected to the cable TV network you must have all EXM units interconnected to a switch and also assure that the Original network ID and the Network ID is set to the same value in all EXM units.

4 Settings (continued)

4.3.5 LCN settings

Before starting, ensure that you have selected the correct **[Logical channel type]** (see page 14). For setting the LCN (Logical Channel Number) you click on the **[+]** sign under the column named **[Options]**. In the box under the label **[Logical channel number]** you write the LCN number you want for the service you have chosen and click the **[Set]** button.

NOTE! LCN shall only be set in EXM units with outgoing muxes. LCN is not supported in all DVB receivers i.e. refer to your manufacturer for specification for the DVB receivers in your cable TV network. All EXM units has to be interconnected to a switch to make the LCN to work properly.

4.3.6 Upload

Update of the ECX-200 firmware or upload of enhanced functionality is done via the Upload menu.

NOTE! Always read the Instructions carefully before starting an upgrade.

Select **[Browse]** and search for the correct file on your computer. When the file is selected press **[Upload]** and the file is uploaded into the ECX-200. When upload is ready you should get a message "Upload completed". Always do a power reset or web reset after finished upload to ensure that the ECX-200 reboots with the uploaded software.

Please refer to the "Upgrade instructions" for each specific SW.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Service management

Available services

Name	Provider	ID	Source	Dig	Ana	CI
Gospel Channel Europe	Telenor	129	Tuner	X		
BBC World News	Telenor	1001	Tuner	X		
BBC Entertainment	Telenor	1103	Tuner			
Star	Telenor	1609	Tuner			
Bloomberg	Telenor	1830	Tuner			
Showtime	Telenor	2111	Tuner			
St-Sh TS	Telenor	2507	Tuner			
History Channel	Telenor	2511	Tuner			
FEM	Telenor	2512	Tuner			
Viasat 4	Telenor	2514	Tuner			
Kjaerulff 1232 Loader	Telenor	2917	Tuner			

Service details

Service ID: 129
Transport ID: 25
Network ID: 70
Source: Tuner

Logical channel number

2 Set Remove

Output:

Set digital Set analogue Remove analogue

Decryption:

Enable Disable

Digital output

Outgoing data rate: 6.12 Mbit/s
Configured data rate: 38.02 Mbit/s

Name	Provider	ID	Source	Options
Gospel Channel Europe	Telenor	129	Tuner	+
BBC World News	Telenor	1001	Tuner	+

Remove selected Reset services Network settings

EXM Web Control Interface



System Input Output IPTV Service management CryptoLITE CI Upload

Upload

File to Upload:

File list

File	Version	Build
UI for EXX-200	1.22	1.830
Audio DSP		1.001
Audio DSP for EXX-200	1.14	1.000
Video DSP		1.001
Video DSP for EXX-200	1.14	1.000
FPGA (variant: 4)		1.320
FPGA (variant: 3)		1.320
FPGA (variant: 2)		1.320
FPGA (variant: 1)		1.000
FPGA		1.000
Firmware for EXX-200	1.22	1.900

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4 Settings (continued)

4.2.6 IPTV output (SW option)

This menu allows for settings required to transmit a digital-TV transport stream as IPTV. IPTV output is optional and can be ordered separately as a SW option (see chapter 7, SW Options).

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

IPTV output

Address: 239 192 0 10
Port: 1234

Bitrate (Mbit/s): 35

For IPTV out you have to set [UDP/RTP] values for Port and Address, e.g.: IP address 239.192.0.10 and Port 1234. In the "Bitrate" box you can choose bitrate for the IPTV TS out. The maximum value is 55Mb/s. Click [Set bitrate] to save settings. Click [Start] to start IPTV streaming on the output (RJ 45 connector). To check the IPTV out signal, use VLC Player or similar.

NOTE! To avoid overload it's not recommended to run other RF output at the same time as IPTV out e.g. choose ASI as Output. The chosen bitrate will be the same on the ASI output

4.2.7 CI and Smart card information

This menu allows you to view information about your CA-system and current subscriptions etc. There is also an [Advanced settings] menu, but we recommend to NOT change in this menu if you are not aware of what the effect will be. If you by mistake have changed any setting you can always click on the "Reset button" to come back to Default settings.

EXM Web Control Interface



System Input Output Service management CI Upload

CI

[Advanced settings](#)

Card insert poll interval (ms): 100
Module reply timeout (ms): 1000
Module poll interval (ms): 100
Min delay between PMT's (ms): 0
Min delay between sends (ms): 0
Use "update" command: ☒
Decrypt video: ☒
Decrypt audio: ☒
Decrypt subtitle/teletext: ☒
Decrypt other: ☐

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5 About remultiplexing

To be sure that you don't exceed maximum bit rate for an output MUX, please control that you don't select too many services.

If you run a third party SNMP program you can monitor the Output bitrate and see that the outgoing bitrate is not too high.
See Chapter 8 for more information about SNMP.

The table below gives max bit rates for COFDM and QAM out from ECX-200.

NOTE! Due to bit rate fluctuations from statistical multiplexing, we recommend that you use maximum 85% of the theoretical available bit rate

Output signal	Modulation	Baudrate/BW	Max bitrate (Mb/s)	85%
COFDM	64QAM	8 MHz	31,67	26,92
COFDM	64QAM	7 MHz	27,71	23,55
COFDM	64QAM	6 MHz	23,75	20,19
QAM	16QAM	6.875 Mbaud/s	25,34	21,54
QAM	32QAM	6,875 Mbaud/s	31,68	26,93
QAM	64QAM	6.875 Mbaud/s	38,01	32,31
QAM	128QAM	6.875 Mbaud/s	44,35	37,70
QAM	256QAM	6.875 Mbaud/s	50,69	43,08

Table 1. Max bit rates for COFDM and QAM.

*The formula for calculating QAM output bitrate is: [Baudrate x "A"/(204/188)]
where "A" is 4 for 16QAM, 5 for 32QAM, 6 for 64QAM, 7 for 128QAM and 8 for 256QAM mode.*

6 Installation and Configuration examples

The ECX-200 can be installed either as a stand alone unit (Wall mount kit for single EXM unit) or in a base unit (EBU-100).

Before connecting power to the ECX-200, make sure that all other connections have been made. A coaxial cable of good quality with an F-connector should be connected from the cable network to the antenna input and another one from the RF output to the cable TV network. Connect a power supply and make all necessary settings as described in section 4.

Note! Important information in page 4 about connecting the DC cable.



Installation in a base unit with 5 EXM modules and common power supply.

Accessories



EPP-100 power supply 100W, 11 outputs
Art no: 103100.02



ESP-110 single power supply 25W, 1 output
Art no: 103200.02



DC-cable for ECX-200
Art no: 500200.01



A/V cable EXM
Art no: 500210.01



ASI cable 250mm
Art no: 500250.01



EBU-100 Base unit for 5 ECX-200 modules and power supply EPP
Art no: 104100.01



EXM wall mount
Art no: 121000.01



EXM style cover plate 50mm
Art no: 700004.10



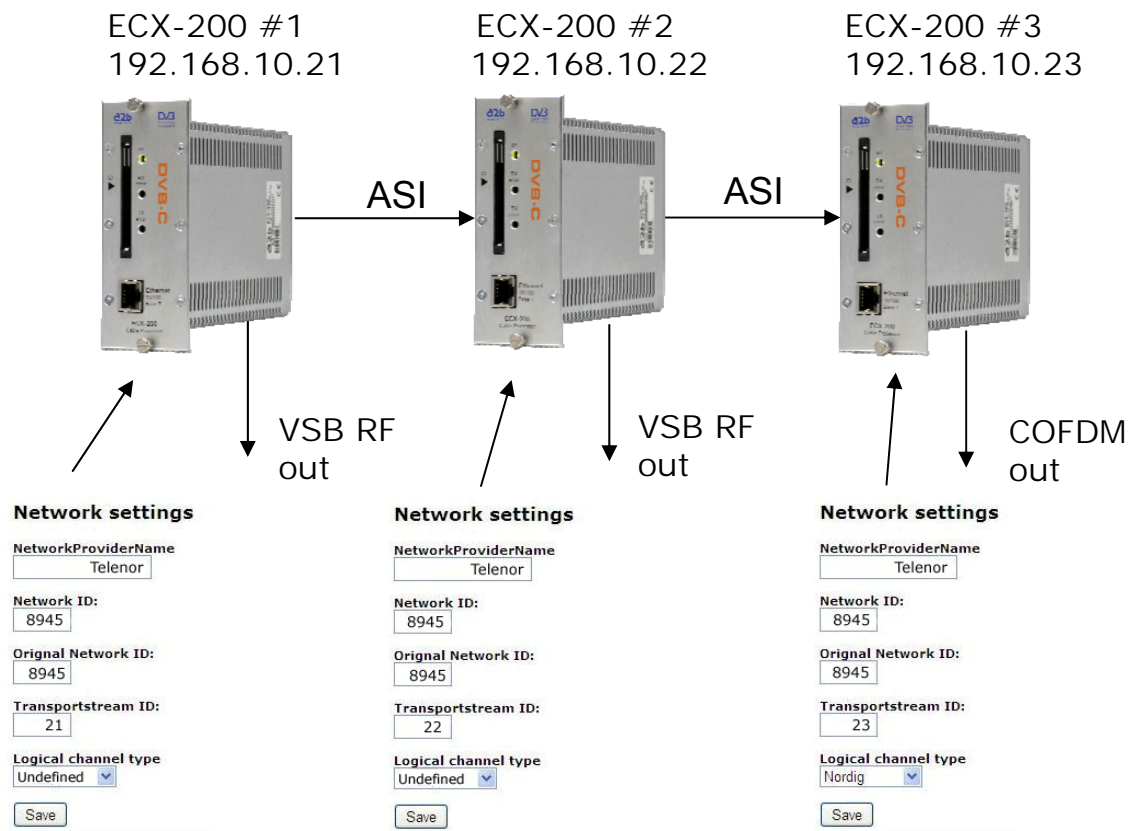
EXM style cover plate 20mm
Art no: 700003.10



ASI cable 1000mm
Art no: 501000.01

6 Installation and Configuration examples (cont.)

6.1 Configuration examples: Network settings COFDM out, Mux #1



As you can see the **Network ID** and **Original Network ID** (ONID) should be the same in all units and preferable the same ID as the Main terrestrial operator are using (in Sweden Teracom and they use 8945 as ONID). Network ID could have another value than the ONID but most of STB and TV with inbuilt STB will accept same ID for Network ID and ONID.

To avoid problems between two or more Muxes in a Headend it's recommended to use different **Transport Stream ID** (TSID) for each EXM unit in the same Headend. A rule to make the TSID easier to remember is to use same TSID as the last digits in the IP address of the unit. This also makes it easier to remember if a unit shall be replaced.

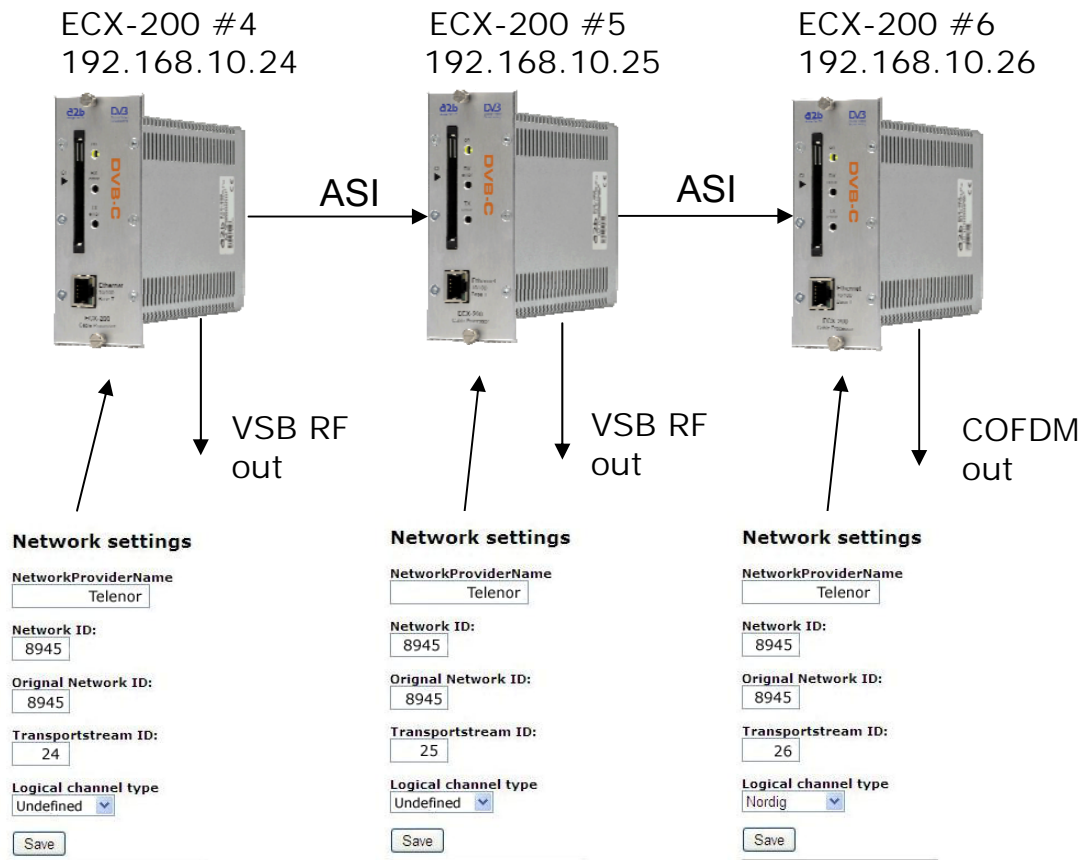
NetworkProviderName is possible to change. However, if you do not know what STB:s and TV sets customer use it's NOT recommended to change. If the owner of the Headend also provide all STB:s to all households in the Cable TV network this could be changed.

The choice of **Logical channel type** is depending on in which country the installation is made. For the Nordic countries the correct choice is "Nordig". This should be chosen only in the unit with the outgoing MUX i.e. in other units the correct choice is "Undefined". For other countries refer to your DVB specification. Beside Nordig you can choose between EACEM and Independent Television.
(See next page for configuration of Mux #2).

NOTE! All three units has SW option EXM-RT.

6 Installation and Configuration examples (cont.)

6.1 Configuration examples: Network settings COFDM out, Mux #2



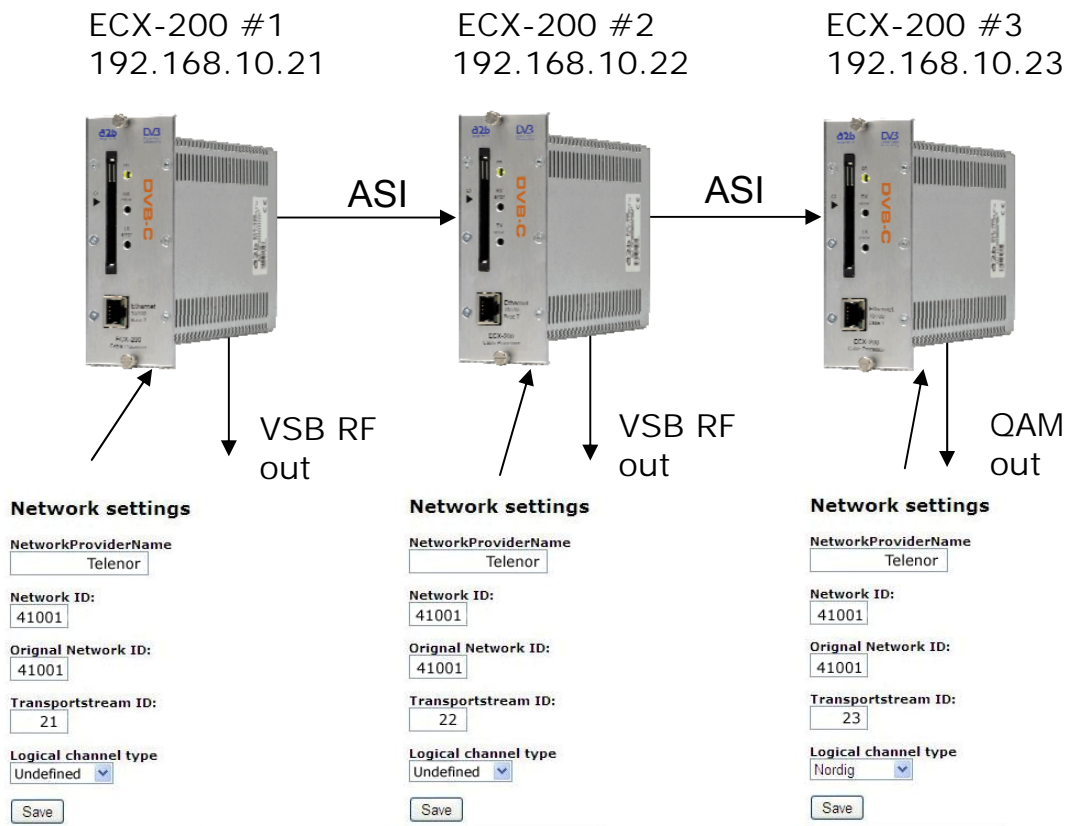
As you can see, the **Network ID** and the **Original Network ID (ONID)** is the same as in the units in MUX #1. The only difference is that all units in this Mux has other **Transportstream ID** than in MUX #1 (here also chosen as the last digits in the IP address).

When building a third Mux you shall use the same settings i.e. **same Network ID and ONID** but different **Transportstream ID**.

NOTE! All three units has SW option EXM-RT.

6 Installation and Configuration examples (cont.)

6.2 Configuration examples: Network settings QAM out, Mux #1



As you can see the **Network ID** and **Original Network ID (ONID)** should be the same in all units and preferable the same ID as the Main Cable operator use (in Sweden ComHem are using 41001 as Network ID). Network ID could have another value than the ONID but most of STB:s and TV:s with inbuilt STB will accept same ID for Network ID and ONID.

To avoid problems between two or more Muxes in a Headend it's recommended to use different **Transport Stream ID (TSID)** for each EXM unit in the same Headend. A rule to make the TSID easier to remember is to use same TSID as the last digits in the IP address of the unit. This also makes it easier to remember if a unit shall be replaced.

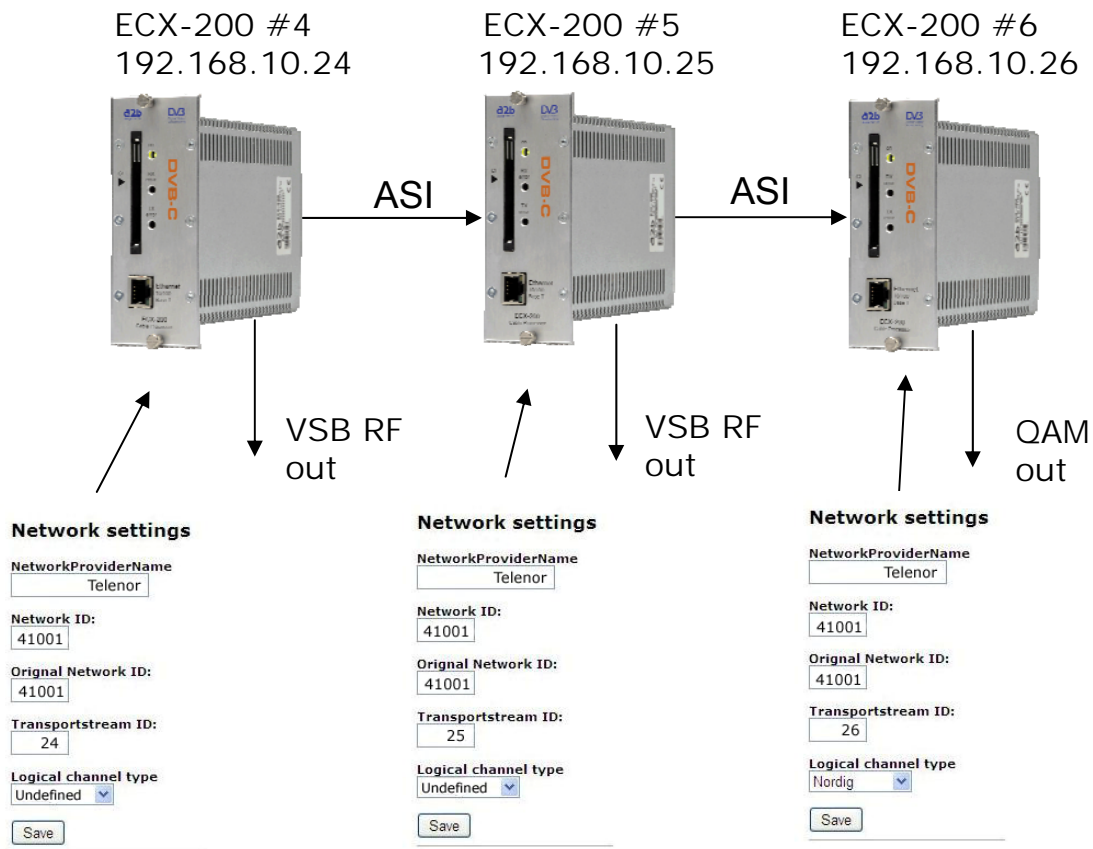
NetworkProviderName is possible to change. However, if you do not know what STB:s and TV sets customer use it's NOT recommended to change. If the owner of the Headend also provide all STB:s to all households in the Cable TV network this could be changed.

The choice of **Logical channel type** is depending on in which country the installation is made. For the Nordic countries the correct choice is "Nordig". This should be chosen only in the unit with the outgoing MUX i.e. in other units the correct choice is "Undefined". For other countries refer to your DVB specification. Beside Nordig you can choose between EACEM and Independent Television.

(See next page for configuration of Mux #2).

6 Installation and Configuration examples (cont.)

6.2 Configuration examples: Network settings QAM out, Mux #2



As you can see, the **Network ID** and the **Original Network ID (ONID)** is the same as in the units in MUX #1. The only difference is that all units in this Mux has other **Transportstream ID** than in MUX #1 (here also chosen as the last digits in the IP address).

When building a third Mux you use the same settings i.e. **same Network ID and ONID but different Transportstream ID**.

NOTE! All three units has SW option EXM-RC.

6.2 Set Top Box.

To be able to run QAM or COFDM together with some Set top boxes in order to avoid the message "New channels found", due to NIT and SDT update, you have to do the installation in the ESX/ETX/ECX-200 Head end according to the following instructions:

1. Make sure there is no QAM or COFDM signal out from the Head end during the installation/modification.
2. Make all settings in all units including Network settings and LCN.
3. Write following command via Telnet in the units that has COFDM or QAM as output: `tsmux.box_variant(2)`
4. Remove the power from these units and reconnect one of the units.
5. Wait 2 minutes before connecting the next unit to power.
6. Connect the next unit after one minute and proceed with the rest until all units are powered.
7. Connect the RF out again from the Head end.

We recommend you to do a new channel search in the STB:s after this operation.

The command "tsmux.box_variant(1)" sets back default functionality.
If you want to go back to box_variant(1) do the same procedure as for box_variant(2).

NOTE! Above described functionality will only be available when all EXM units are connected through a switch.

6.1.3 Installation of ECX-200 units through a switch with DHCP with possibility for remote management over VPN connection between office and Head end.



ECX-200 connected through a switch with DHCP

VPN connection



NOTE! If you have questions about how to set up the VPN connection ask your network administrator for detailed information.

7 SW options

It is possible to upgrade your ECX-200 with one or more SW options. Below you can read about available options. For price list, contact your distributor, see www.a2b.se , Partners.

In the System menu you can see what SW options are presently available in your ECX-200.

7.1 EXM-Basic, Basic Functionality

If you have purchased a ESCX-200 without any SW options you have this basic entitlement which include DVB-C input and analogue output. ASI output is available. ASI input is disabled.

NOTE! ASI output is without remux i.e. no table changes are made.

7.2 EXM-RC, Remux and QAM out

This SW option allows you to do remuxing and QAM modulation.

7.3 EXM-RT, Remux and COFDM out

This SW option allows you to do remuxing and COFDM modulation.

7.4 EXM-RIPout, Remux and IPTV out

This SW option allows you to do remuxing and IPTV out.

7.5 EXM-AV, Audio/Video out

This SW option allows for A/V out at the back plane A/V connector.

7.6 EXM-ALL, software package.

This SW option includes EXM-RC, EXM-RT, EXM-RIPout and EXM-AV

7.7 EXM-Demo, software package

30 days evaluation SW option (includes same options as EXM-ALL).

7 SW options (continued)

7.8 EXM-CL, CryptoLITE

This SW option allows you to encrypt output channels in a mux with Cryptoguard, without any need for an encryption server. For more information please contact Cryptoguard, phone +46-(0)971-10735.

To encrypt a service, select the service and then click on "Add Service(s)".

EXM Web Control Interface



System

Input

Output


IPTV

Service management

CryptoLITE

CI

Upload



Configuration

SuperCAS

0x4aea0000

Set SuperCAS

Add Services

Name	Provider	ID	Source	Enabled	V-Pid	A-Pid
MTVNHD		1730	Tuner			
SVT24	Sveriges Television	1240	Tuner		1248	1249
SVT1 Östnytt	Sveriges Television	5840	Tuner		1018	1019
SVT2 Östnytt	Sveriges Television	5640	Tuner		1028	1029

Add Service(s)

Remove Service(s)

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7 SW options (continued)

7.9 EXM-SC, Simulcrypt

This SW option allows you to encrypt a Mux in an EXM unit. When this SW option is uploaded to the unit a new menu will be available (see below).

NOTE! Does not include the encryption equipment such as encryption server, SMS etc.

Simulcrypt

CA-Server Configuration

ECM addr	ECM-Port	EMM addr	EMM-Port	EMM Datarate	SuperCAS
<input type="text" value="0.0.0.0"/>	<input type="text" value="1101"/>	<input type="text" value="0.0.0.0"/>	<input type="text" value="1105"/>	<input type="text" value="100"/>	<input type="text" value="0x0b000000"/>
<input type="button" value="Add server"/>					

Available CA-Servers

Srv Id	ECM addr	ECM-Port	EMM addr	EMM-Port	SuperCAS	State	# emm:s
1	172.17.1.3	1101	172.17.1.3	1105	0x0b000000	Running	0:0

ECM-Generator

Access Criteria (Start with 0x... Hexnumber, #... Hexvalue, otherwise Stringvalue)
<input type="text" value="0x00000000"/>
<input type="button" value="Add ECM-Generator"/>

Available ECM Generators

ECM Id	Access Criteria	Srv Id	# ecm:s	Status:
 1	0x00000000	1	17985	Req. ECM
 2	0x00000000	1	17978	Req. ECM
 3	0x00000000	1	17978	Req. ECM
 4	0x00000000	1	17976	Req. ECM






ECM-Generator

Access Criteria (Start with 0x... Hexnumber, #... Hexvalue, otherwise Stringvalue)
<input type="text" value="0x00000000"/>
<input type="button" value="Add ECM-Generator"/>

Available ECM Generators

ECM Id	Access Criteria	Srv Id	# ecm:s	Status:
 1	0x00000000	1	17994	Req. ECM
 2	0x00000000	1	17987	Req. ECM
 3	0x00000000	1	17987	Req. ECM
 4	0x00000000	1	17985	Req. ECM

Available Services

Name	Provider	SID	Source	ECM Id:s	V-Pid	A-Pid
 SVT24	Sveriges Television	1240	ASI			
 SVT2 Östnytt	Sveriges Television	5640	ASI	3	<input checked="" type="checkbox"/> 1029	<input checked="" type="checkbox"/> 1028
 SVT1 Östnytt	Sveriges Television	5840	ASI	2	<input type="checkbox"/> 1019	<input type="checkbox"/> 1018
 Barn/Kunskapsk.	Sveriges Television	870	ASI	1	<input checked="" type="checkbox"/> 879	<input checked="" type="checkbox"/> 878
 TV3 Stockholm	Viasat	1100	Tuner	4	<input checked="" type="checkbox"/> 1101	<input checked="" type="checkbox"/> 1102

7 SW options (continued)

7.9 EXM-SC, Simulcrypt (cont.)

The setup of encryption of services with Simulcrypt is described below:

1. Make the necessary connection between the EXM unit and the encryption server. For more information about **[Server configuration]**, please refer to your provider of the CA system. As you see it's possible to have different CA server for ECM and for EMM.
2. When connected to a CA server and that server is running you click on the line with the "Running server" you want to use. Ensure that line is "marked" dark blue.
3. Click on **[Add ECM Generator]** to create one ECM generator.
4. Repeat step 2 and step 3 above to create more ECM generators. You must create one ECM generator for each service to encrypt.

Available CA-Servers

Srv Id	ECM addr	ECM-Port	EMM addr	EMM-Port	SuperCAS	State	# emm:s
1	172.17.1.3	1101	172.17.1.3	1105	0x0b000000	Running	1:27487

ECM-Generator

Access Criteria (Start with 0x... Hexnumber, #... Hexvalue, otherwise Stringvalue)

0x00000000

← Click here

Available ECM Generators

ECM Id	Access Criteria	Srv Id	# ecm:s	Status:
1	0x00000000	1	6674	Req. ECM
2	0x00000000	1	6674	Send ECM
3	0x00000000	1	6674	Send ECM
4	0x00000000	1	6675	Req. ECM

5. Click on the line with the first ECM generator (1) to mark that ECM generator. Click on the service under **[Add Services]** that you want to encrypt and click on **[Add Service(s)]**

6. Repeat step 5 to encrypt the rest of the services that should be encrypted

Available ECM Generators

ECM Id	Access Criteria	Srv Id	# ecm:s	Status:
1	0x00000000	1	6697	Req. ECM
2	0x00000000	1	6697	Send ECM
3	0x00000000	1	6697	Send ECM
4	0x00000000	1	6698	Req. ECM

Available Services

Name	Provider	SID	Source	ECM Id:s	V-Pid	A-Pid
SVT24	Sveriges Television	1240	ASI			
SVT2 Östnytt	Sveriges Television	5640	ASI	2	1029	1028
SVT1 Östnytt	Sveriges Television	5840	ASI	1	1019	1018
Barn/Kunskapsk.	Sveriges Television	870	ASI	4	879	878
TV3 Stockholm		1100	Tuner	3	1101	1102

Click here →

8 SNMP

With FW from version 1.22 and later in the ECX-200 you are able to use the SNMP Interface for monitoring the ECX-200. To enter the SNMP menu on the unit, write: `/snmp.html` after the IP address in the web browser.

Example: `192.168.0.20/snmp.html`

In the **[SNMP agent]** part of the menu you can start the SNMP agent, select Listen port, Read community, Write community.

In the **[SNMP traps]** part of this menu you can select Dest. Address (IP address to the PC that is listening), Dest. port and Community.

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

SNMP agent

Listen port:
Read community:
Write community:

SNMP agent = the “agent” (SW) that listens for GET or SET

Listen port = port to listen to

SNMP traps

Dest. address:
Dest. port:
Community:

Read community = “password” for Management System to be able to access SNMP agents for GET commands. “Public” as default.

Write community = “password” for Management System to be able to access SNMP agents for SET commands (not implemented yet). “Public” as default.

[Download MIB-files \(a2b-mibs.zip\)](#)

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SNMP traps = the “trap” (SW in EXM) that sends information to the Management System when defined instances occur

Dest. address = IP address to host for Management System

Dest. port = port in MS host

Community = “password” for Management System to be able to access SNMP traps. “Public” as default.

NOTE! To be able to use the SNMP you need to use a 3rd party program. One program you can download for trial is <http://www.ireasoning.com/mibbrowser.shtml>. Download the a2b-mibs.zip file that is found in the SNMP menu, unzip and copy the two mib files into the MIB map in the 3rd party program.

9 Technical specification

ECX-200 DVB-C Cable processor

Connectors and Interfaces

Control and IP out connector	RJ-45, 10/100 BaseT
RF input connector	F female, 75 Ω
RF output connector	F female, 75 Ω
ASI input connector	BNC female, 75 Ω
ASI output connector	BNC female, 75 Ω
CAM connector	PCMCIA (5 VDC)
LED Indicator lights	Power on, QAM/Rx error, Tx/Access error
SNMP Interface	RJ-45, 10/100 BaseT
A/V out connector	3,5 mm 4 pole

QAM Cable Receiver

Input frequency	50 - 858 MHz (centre freq.)
Input freq step size	250 kHz
Input level range	-55 to -25 dBm *)
Input impedance	75 Ω
Input return loss	12 dB
QAM mode	16, 32, 64, 128 or 256 QAM
Baud rates	3000 to 7000 kS/s
C/N limit	26 dB *)
Bandwidth	8 MHz
DVB compliance	DVB-C

*) QEF reception with test signal: 64QAM, 26 dB C/N

RF Modulation (analogue)

Standards	B/G, I, D/K, L, M/N
Sound	Mono, NICAM stereo or A2/A2* stereo
Modulation video	VSB AM, neg. or pos.
Modulation mono	Audio FM or AM
Output frequency	47 - 862 MHz (1 kHz step)
Output level	≥ 110 dBuV (47-470 MHz) ≥ 105 dBuV (470-862 MHz)
S/N weighted	≥ 57 dB
C/N, broadband	≥ 70 dB
NICAM standards	NICAM 728 (EN 300 163)
Power ratio	B/G -20dB,
(Vision/NICAM carrier)	I -24dB, D/K -24dB, L -27dB
Tolerance	+/- 1dB
Impedance	75 Ω

QAM modulation (SW Option)

QAM modes	16, 32, 64, 128 and 256 QAM
Symbol rate	4 - 7.2 Mbaud/s
MER (at RF out)	> 38 dB for 256-QAM
DVB compliance	DVB-C (EN 300 429)
QAM output frequency	47 - 862 MHz (1 kHz step)
Output level	Min 105 dBuV (47-470 MHz) Min 100 dBuV (470-862 MHz)
PSI/SI management	Yes
Remultiplexing	Yes

COFDM modulation (SW Option)

COFDM mode	2K
Guard interval	1/32
FEC	7/8
MER	>34 dB
DVB compliance	DVB-T (EN 300 744)
Max output bitrate	31,67 Mbit/s (8 MHz bandwidth) 27,71 Mbit/s (7 MHz bandwidth) 23,75 Mbit/s (6 MHz bandwidth)
Output frequency	47 - 862 MHz (1 kHz step)
Output level	Min 100 dBuV (47-470 MHz) Min 95 dBuV (470-862 MHz)
PSI/SI management	Yes
Remultiplexing	Yes

IPTV out (SW Option)

Max output bit rate	55 Mbit/s *)
Connector	RJ 45 (same as control)
Output protocol	UDP, Multicast or Unicast
PSI/SI management	Yes
Remultiplexing	Yes

*) Single SPTS/MPTS and only IPTV as output

Miscellaneous

Power supply	7,5 VDC nom. (6-10 VDC)
Power consumption	Typ. 15 W
Dimensions	165x105x37 mm (excl. connectors)
Weight	Approx. 390 g
Controller	Embedded web server
Operating temperature	-20 to +50°C, non condensing

This specification may change without prior notice.

ASI input (SW option) - output

ASI bit rate	270 Mbit/s
Max payload bitrates:	
Input bit rate	55 Mbit/s *)
Output bit rate	55 Mbit/s *)
PCR restamping	Yes
PSI/SI management	Yes
Remultiplexing	Yes

*) The input, output and throughput bitrate is highly dependent on the type of application that is running in the unit.

MPEG Decoder - Audio

Supported formats	MPEG 1 layer II, AAC HE,
Output	Selection of Dual mono in, Stereo or Mono
Impedance	< 100 Ω
Output level	0 dBu
Level adjustment	+3 to -9dB

MPEG Decoder - Video

Supported formats	MPEG2 MP@ML, MPEG4 H.264 AVC
Output standards	PAL, SECAM or NTSC
Impedance	75 Ω
Output level	1 Vpp @ 75 Ω
Aspect Ratio	Letterbox, Pan/Scan, or conversion Combined (14:9) programmable, WSS
Teletext	Insertion in VBI
Subtitling	Teletext or DVB subtitling
Decryption	Common Interface (PCMCIA 5VDC)
Multidecryption	Yes *)

*) SW option is needed

Remultiplexing (SW option)

Each ECX-200 contains a remultiplexer for 2 incoming transport streams. The transport streams can be received from cable and from the ASI input. PID remapping is made automatically.

The following components can be remultiplexed:

Audio, Video, Subtitling, PAT, PMT, NIT actual, EIT, CAT, SDT, TDT and TOT.

IP connection between EXM units in a system is required for NIT, EIT other and SDT other.

Graphical User Interface (GUI)

EXM Web Control Interface



System Input Output IPTV Service management CI Upload

Current settings

Tuner: DVB-C
Output: Analogue
IPTV out: Disabled
Tuner locked: Yes
Firmware version: EXX-200 version 1.23
Bootloader version: 1.02
Hardware revision: 1203
Serial number: 0350010022402054

Software options

Basic functionality (EXM-Basic)
Enabled options: EXM-RC, EXM-RT, EXM-RIPout, EXM-AV (EXM-ALL)

System options

IP address:	172	19	99	48
Netmask:	255	255	0	0
Gateway:	172	19	0	1

System diagnostic

[Download diagnostic file](#)

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Graphical User Interface for easy set up of complex systems. Simple handling of remultiplexing and creation of new multiplexes from any input.

Default settings of PSI/SI tables to avoid clashes in the output multiplexes.

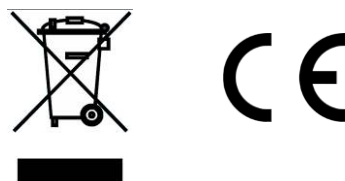
Simple structure for setting input, output and processing parameters.

Each ECX-200 contains an embedded web server. Standard web browsers (Internet Explorer 8, Mozilla Firefox etc.) are supported.

With FW 1.22 (or later) in your ECX-200 you also can use a third party program for surveillance via the SNMP interface.

10 Declaration of Conformity

The document for Declaration of Conformity you will find at www.a2b.se.



Further information at www.a2b.se.

11 Glossary

DVB	Digital Video Broadcasting (Standardization body)
MPEG-2	Compression format for digital TV
MPEG-4	Compression format for digital TV (SD and HD)
H.264 AVC	Format for compression of the video in HDTV
VSF	Vestigial Side Band (adjacent channel RF modulation)
ASI	Asynchronous Serial Interface (High Speed Interface)
NICAM	Digital sound format for analogue TV transmission
IP	Internet Protocol (defines how data is packetized for Internet broadcast)
IPTV	TV-content packetized for Internet Protocol
DVB-T	Modulation format (COFDM) for terrestrial transmission of digital-TV
QAM	Modulation standard for digital TV in cable networks
COFDM	Modulation standard for digital TV in terrestrial networks
Remultiplexing	Way of recombining services from different multiplexes
DHCP	Dynamic Host Configuration Protocol is a protocol used by networked devices (<i>clients</i>) to obtain the parameters necessary for operation in an Internet Protocol network. This protocol reduces system administration workload, allowing devices to be added to the network with little or no manual configuration.
Common Interface	Connector for a PCMCIA module used for decrypting encrypted TV programs. Modules should comply with the DVB CI standard
SD	Standard definition TV (576i in Europe)
HD	High Definition TV (720p or 1080i)
LCN	Logical Channel Numbers (method to give specific TV-programs a number that defines the order they appear on a TV or Set Top Box)
VPN	Virtual Private Network (secure point to point connection in an unsecure network)
SMS	Service Management System (system for handling smartcards).
SNMP	Simple Network Management Protocol (SNMP) is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention. SNMP is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). It consists of a set of standards for network management, including an application layer protocol , a database schema , and a set of data objects

Notes

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Notes

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface.



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